MULTIMEDIA UNIVERSITY

STUDENT ID NO

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TABLE NO: _____

# MULTIMEDIA UNIVERSITY

# FINAL EXAMINATION

**TRIMESTER 3, 2017/2018**

## TCP2201 OBJECT ORIENTED ANALYSIS AND DESIGN

(All sections/groups)

4 JUNE 2018
9.00 a.m. – 11.00 a.m.
( 2 Hours )

| Question | Mark |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| Total | |

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**INSTRUCTIONS TO STUDENTS**

a) This question paper contains ten (10) printed pages only including the cover page.
b) Answer **ALL QUESTIONS.**
c) All questions carry equal marks (25 marks) and the distribution of the marks for each sub-question is given.
d) Please write all your answers **in the spaces provided in this question paper.** Additional pages have been provided at the end for your use if the space is insufficient

## Question 1

a) Explain the differences between overloading functions and overriding functions in OO programming language classes.

[4 marks]

b) The Java code below will compile with an error. Describe the type of error it will generate and how the code can be corrected so the classes will compile correctly (Either explain the corrections required OR rewrite the code to show a correct version. You should NOT waste time writing both) [7 marks]

```
class Mammal {
    abstract int eat(int x);
}
class Cat extends Mammal {
     private String name;
}
```

**Continued ...**

c) There are a few differences between an abstract class and an interface in Java. Complete the table below so that it shows the differences from the viewpoint of variables, methods and constructors. An example is given for you.

[10 marks]

| | Abstract Class | Interface |
|---|---|---|
| Variables | | |
| Methods | | **All methods must be public abstract.** |
| Constructors | | |

d) For any programming language to be considered as object-oriented, it should be defined by seven concepts. Briefly describe any four (4) of the concepts.

[4 marks]

**Continued...**

## Question 2

a) List down the six (6) steps involved in generating a UML class diagram

[6 marks]

b) Why is the Java language considered a simple and reliable language? And what makes it able to be platform independent?

[6 marks]

c) List down - in correct order - the six (6) phases/activities that a software project goes through from its beginning to the end and briefly explain the first phase.

[8 marks]

**Continued...**

d) There are 11 principles in system design that should be applied to ensure better project outcomes. Explain briefly any five (5) of the principles and how it affects design.

[5 marks]

**Continued...**

## Question 3

a) Describe the three (3) advantages of using UML diagrams in software design.

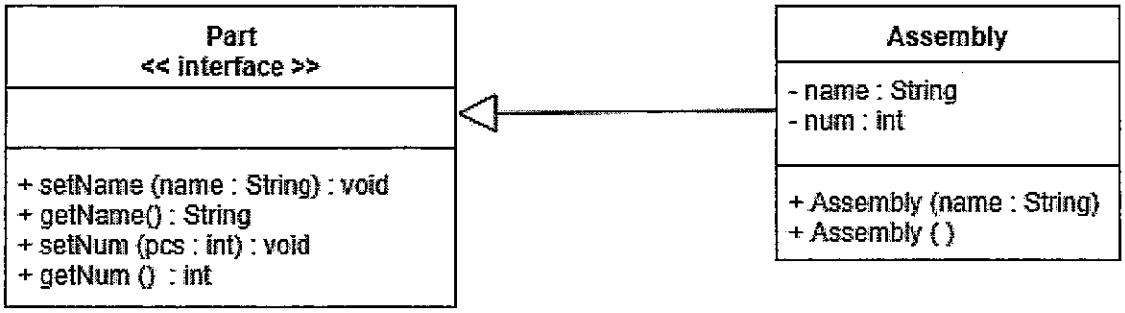
[6 marks]

b) What are UML behavioural diagrams used for? Give two examples of UML behavioural diagrams in your answer

[3 marks]

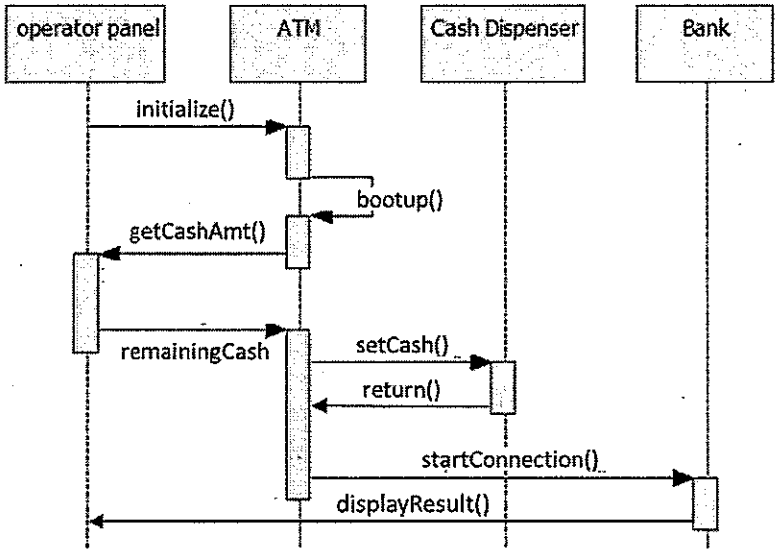
**Continued...**

c) Convert the following UML class diagram into its equivalent Java code. Note that you should complete all the function bodies and the constructors where available.
[8 marks]




**Continued...**

d) Convert the following sequence diagram into its collaboration diagram equivalent. [8 marks]




**Continued...**

## Question 4

a) List three motivations for implementing design patterns

[3 marks]

b) Complete the following table that describes the characteristics and applications of different design patterns. Give one (1) example of design patterns for each category listed and where each category is usually applied to (i.e. what problem does it solve?)

[9 marks]

| Category | Design pattern example | Applicability |
|---|---|---|
| Creational | | |
| Structural | | |
| Behavioural | | |

c) A design pattern is described using eight (8) elements in the Gang of Four book. An example of elements is a design pattern's name and its sample code. Briefly describe any four (4) of the remaining elements.

[8 marks]

**Continued...**

d) To provide component and container interactivity in any Java program, *listeners* are implemented into the program code. These listeners are a form of design pattern implementation in the Java library. Describe which design pattern the Java listeners best match and explain why. Use either Java code or UML diagram(s) to show how the objects in the listener match a design patterns' description and list at least one (1) example of a listener in your answer

[5 marks]

**End of paper**

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